Brooklyn Health Center
620 Fulton Street, Brooklyn NY 11217

Tech Report I, Part 2

Lighting Existing Conditions and Design Criteria

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Executive Summary

Four spaces in the Brooklyn Health Center in Brooklyn, New York, were analyzed and evaluated based on the current conditions of the lighting systems in the construction drawings since the building has not been built. These spaces include:

Clinical Touchdown 3AB00	|	**Large Work Space**
Physical Therapy C205	|	**Special Purpose Space**
Pause Waiting 2L05	|	**Circulation Space**
Privately Owned Public Plaza	|	**Outdoor Space**

These spaces were evaluated based on the existing fixtures and hardware used, controls, and room finishes. Once each space was thoroughly analyzed and evaluated design criterion and considerations were developed. These criterion and considerations were based on current codes, LEED, and psychological reinforcement. All of the spaces meet code now, and the building is aiming for a LEED rating, but there is room for improvement whether it's aesthetic, daylight, or controllability.

A request has been placed for the LEED information, but there is currently no information available that describes what LEED points the building is going for. For this reason the LEED criteria will be added later.

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Building Overview

Building Name
The Brooklyn Health Center

Location
Fulton Street, Brooklyn, NY 11217

Building Occupant Name
York Hotel Trades Council

Occupancy or Function Type
Health care, Retail, Office Space, and Public amenities.

Size (Total square feet)
163,395 sq ft

Number of Stories
12 stories and a basement

Construction Dates
Spring 2015- Winter 2016

Cost Information
Total Cost$120,000,000

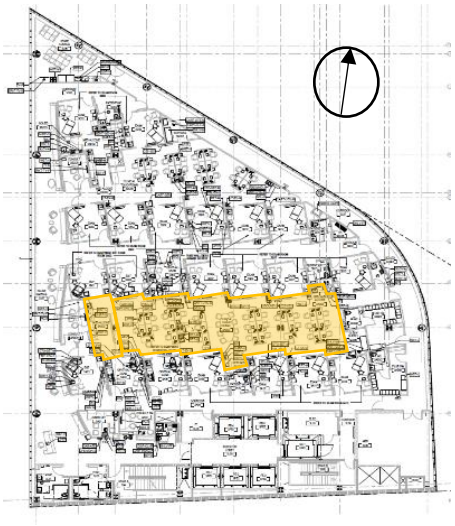
Project Delivery Method
Guaranteed Maximum Price (GMP)

Existing Lighting Overview

The Brooklyn Health Center utilizes only LED fixtures, this was an important stipulation set forth by the owner. This mixed use healthcare facility is separated into several different types of spaces; such as retail and restaurant, healthcare, office space, penthouse spaces, and an open plaza. The building is targeting a LEED silver rating. To achieve this the building has many large curtain walls, very efficient lighting fixtures, and uses natural light as much as possible.

Clinical Touchdown 3AB00

Located on the 3rd floor, the clinical touchdown is essentially an open office spaces for the employees. This office space is in the middle of the floor and completely surrounded by exam rooms. This means there is no natural light entering the space. The lighting in the space consists of two rows of linear fixtures for ambient light, and downlights for task light over the alcoves.



Existing Conditions

Approx. Area | 1500 ft^2
Ceiling Height| 8'6"

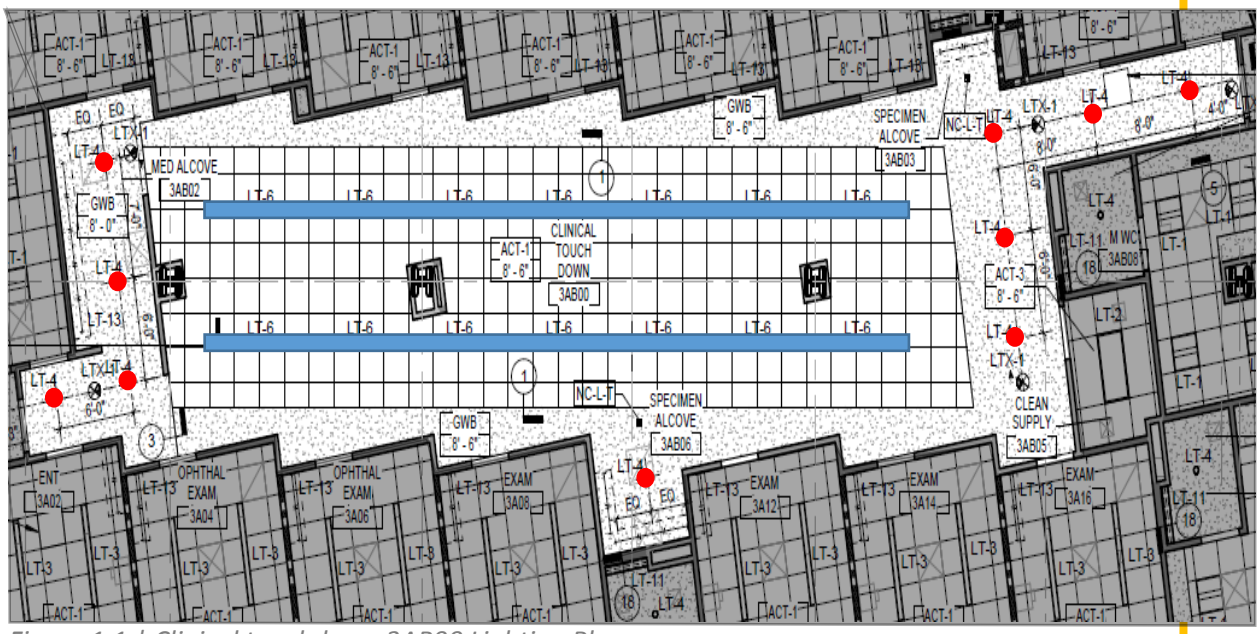


Figure 1.1 | Clinical touchdown 3AB00 Lighting Plan

There are no controls for the clinical touchdown, this space is controlled by occupancy sensors that are in the space.

Type	Description	Watts	Lamp	MFR.
LT-4	Recessed, 4.5" aperture LED downlight with clear diffuse reflector with white trim, wide distribution, and integral electronic 0-10 V dimming driver.	21 W	Integral LED	Focal Point
LT-6	Surface mounted 4" x 4.5" lensed LED direct linear fixture, with a flush mounted satin finish lens, and white finish.	17 W/ft	Integral LED	Focal Point

Table 1.1 | Clinical Touchdown 3AB00 fixture schedule.

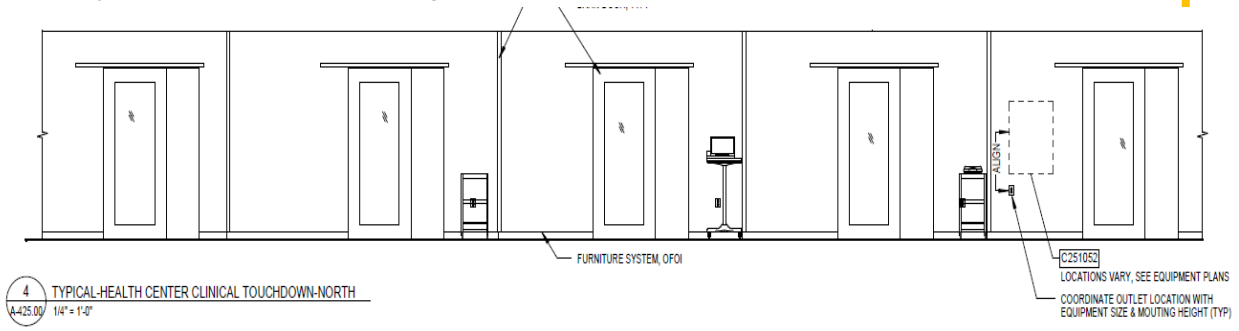


Figure 1.2 | Clinical Touchdown North Elevation.

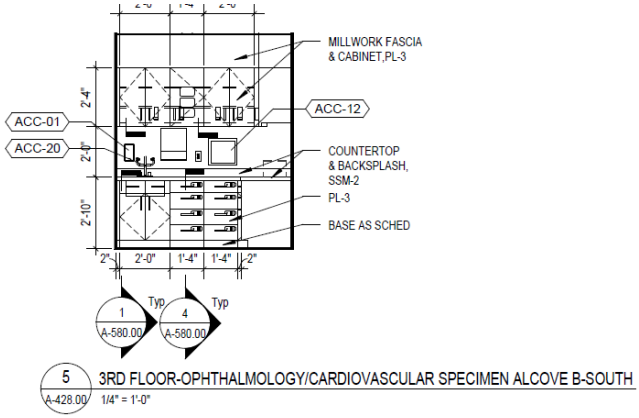


Figure 1.3 | Clinical Touchdown West

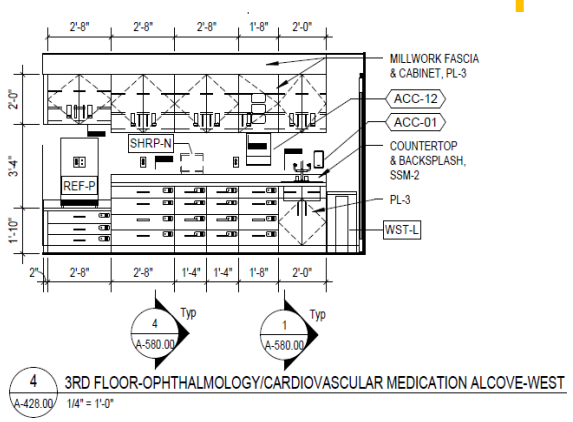


Figure 1.4 | Clinical Touchdown South

The clinical touchdown is similar to many other spaces in the Brooklyn Health Center and uses the same materials that are repeated throughout the building. The center portion of the ceiling is 2' x 2' acoustical ceiling tile, with a border made GWB. The walls in the space are made of GWB with sound attenuation batting and have a coating of eggshell white paint. The floor in the space is finished with French grey resilient floor tile.

Surface	Material	LRV
Ceiling	Acoustical Ceiling Tile	0.86
	GWB	0.83
Walls	GWB with eggshell white paint	0.83
Floor	Resilient Floor Tile	0.40

Table 1.2 | Clinical Touchdown 3AB00 finishes.

Figure 1.5 | Clinical Touchdown 3AB00 furniture plan.

Design Criteria & Considerations

The main goal of the clinical touchdown will be to study the psychological effects of lighting design, specifically the effects that lighting has on making a space feel relaxed versus tense. These are two very opposite feelings that can make a working space like this either very enjoyable or very unpleasant. The employees in this space could likely be working long hours, and may very well be in high stress situations, and a lighting design that could ease a little bit of that could be very beneficial. This can be achieved by non-uniform distribution to keep the space visually interesting and appealing. Using lower overall light levels will prevent the space being uncomfortably bright. Also, Perimeter lighting will be used to emphasize the boundary of the area, giving the employees a sense of enclosure. These will combine to create a relaxed space that people will not mind being in for long periods of time.

E_h	E_v	Avg:Min
400 lux	150 lux	3:1

Table 1.3 | Illuminance Criteria for health care form-filling, instructional reading, medication and chart review.

Space	Allowance
Clinical Touchdown	0.98 W/ ft^2

Table 1.4 | LPD allowance for open office.

Design Priorities

1) Psychological impression
2) Illuminance levels –task
3) Aesthetics

Evaluation of Existing Lighting

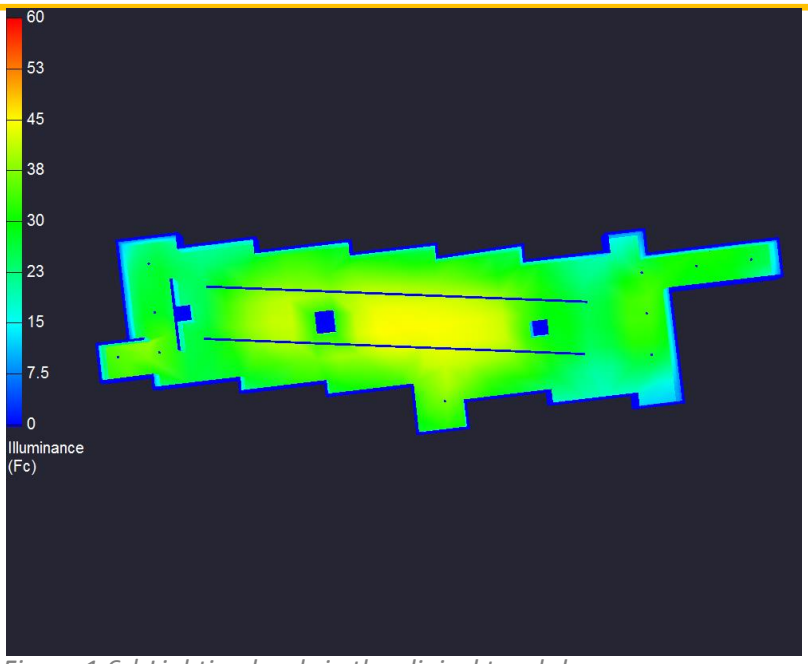


Figure 1.6 | Lighting levels in the clinical touchdown.

E_{avg}	30.08 FC
E_{max}	44.9 FC
E_{min}	0.4 FC
$E_{Max/Min}$	112.25

Table 1.5 |Lighting Metrics

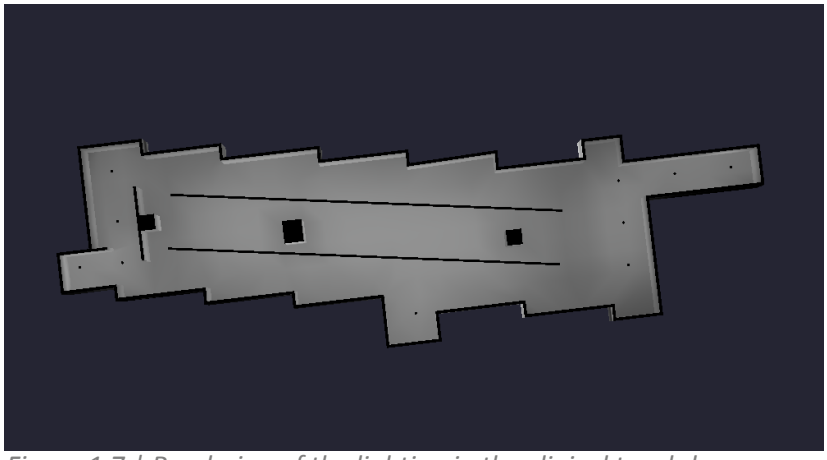
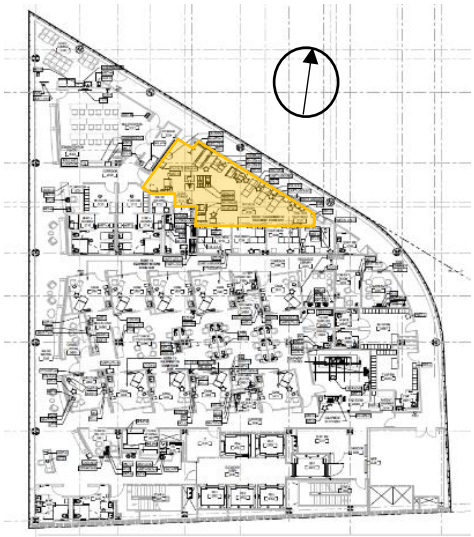


Figure 1.7 | Rendering of the lighting in the clinical touchdown.

The lighting in this space is not very good. The two linear fixtures that are the primary lighting in the space are not a very good solution. The lighting in the space is not very uniform, and there are several low spots in the corners. Although the LPD is very low the spaces lighting is less than great. There aren't any real glare problems in the space. Making the layout more appropriate and tailored to the furniture and functions could drastically improve this space. Also, making the illuminance more uniform could make the space more pleasant.

Physical Therapy C205

Located on the 2nd floor, the physical therapy room is a room that has many purposes. This room is in the middle of the floor and is surrounded by different rooms on three sides, and a hallways on the east side. There are windows on the east side wall adjacent to the hallway and these should allow a good amount of natural light in from the glass curtain wall on the opposite side of the hallway. The lighting in the space consists of 2 x 2 luminaires that are 8 ft on center by 6 ft on center and align with the ceiling tiles.



Existing Conditions

Approx. Area | 800 ft²
Ceiling Height| 8'6"

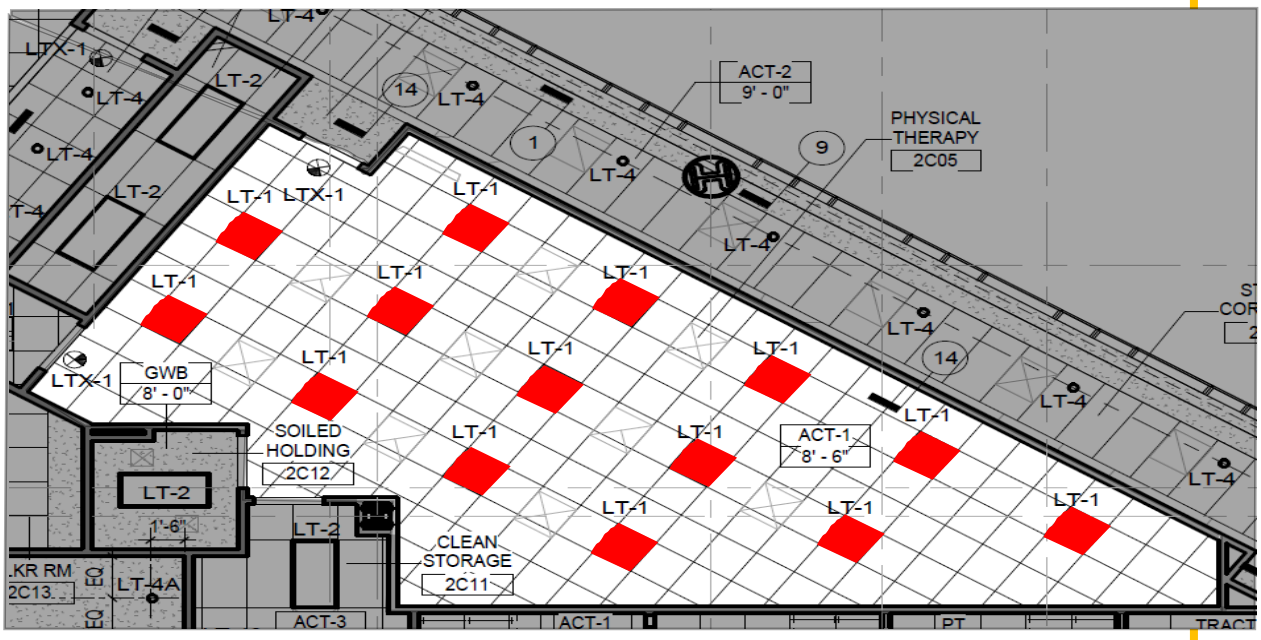


Figure 2.1 | Physical Therapy C205 Lighting Plan

This room does not have any controls, the lights are automated by 5 occupancy sensors on the ceiling.

Type	Description	Watts	Lamp	MFR.
LT-1	Recessed, 2’ x 2’ troffer LED fixture, die formed, post-painted 20 gauge cold rolled steel with white finish, flat acrylic microprismatic lens, and integral electronic 0-10 V dimming driver.	38 W	Integral LED	Focal Point

Table 2.1 | Physical Therapy C205 fixture schedule.

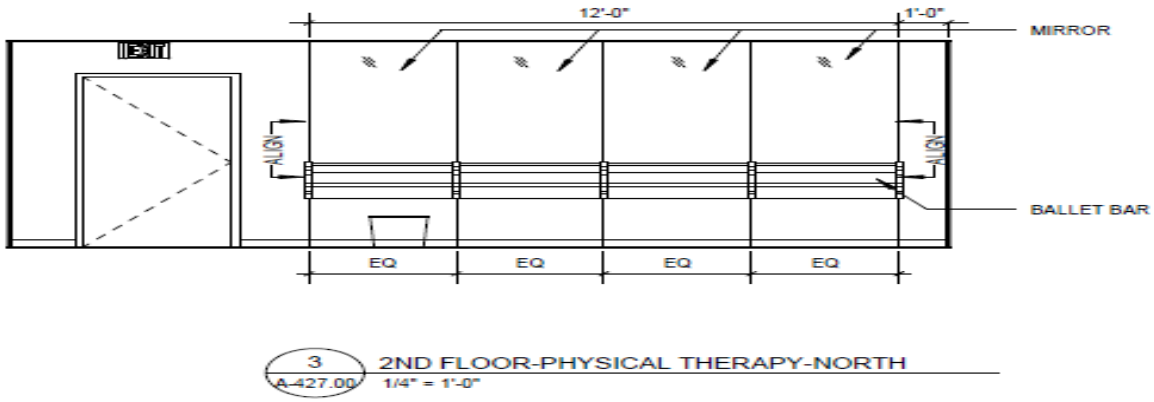


Figure 2.2 | Physical Therapy C205 North Elevation.

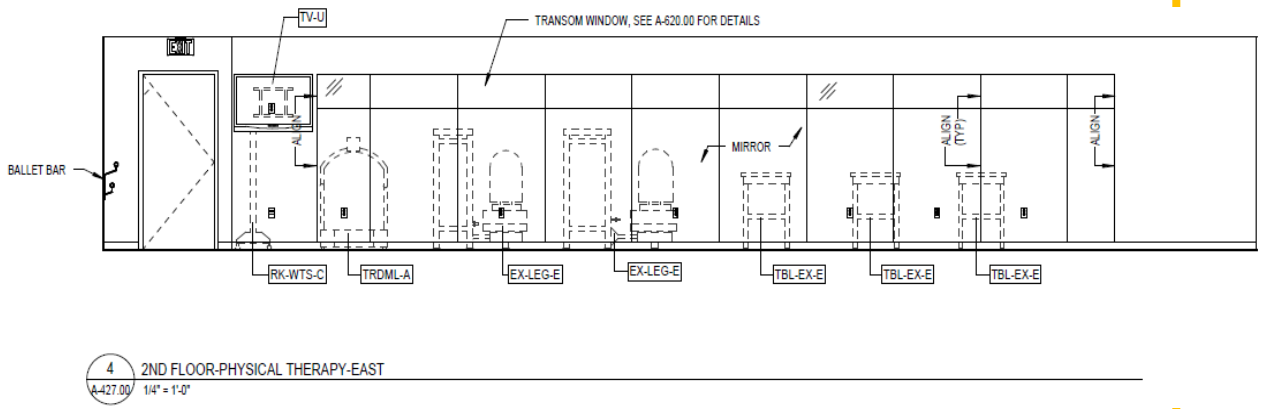


Figure 2.3 | Physical Therapy C205 East Elevation.

Although the physical therapy room uses materials that are repeated throughout the building there are some differences. The ceiling is simply 2’ x 2’ acoustical ceiling tiles. The walls in the space are made of GWB with sound attenuation batting and have a coating of eggshell white paint, but the east wall in the space is primarily covered by mirrors with a row of windows at the top. The floor in the space is finished with black tie resilient sheet flooring.

Surface	Material	LRV
Walls	GWB with eggshell white paint	0.83
	Mirrors	1.00
Ceiling	Acoustical Ceiling Tile	0.86
Floor	Resilient Sheet Flooring	0.15

Figure 2.2 | Physical Therapy C205 finishes.

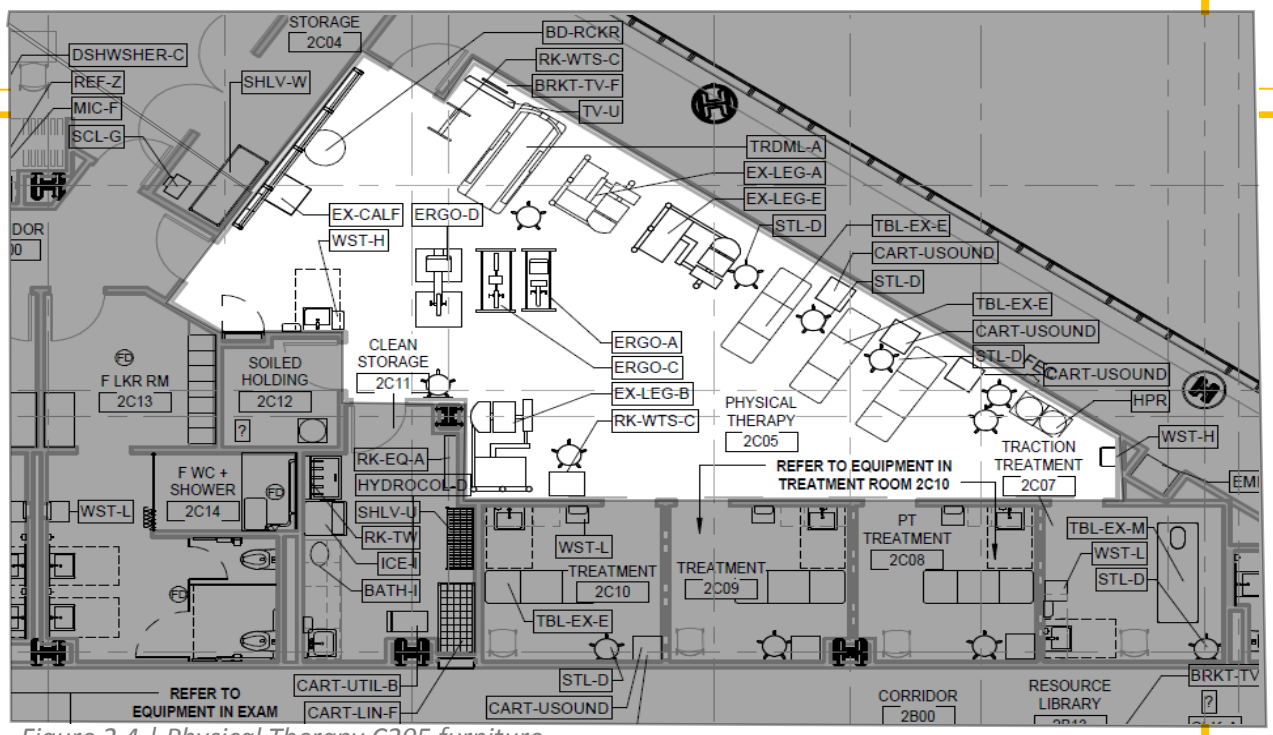


Figure 2.4 | Physical Therapy C205 furniture

Design Criteria & Considerations

This space has many different functions, and most of them require exercise or work. For this reason I think that adding daylight to the space could make it more enjoyable to be in. I think adding more and different types of lighting will also give more flexibility to the space since it has a variety of uses. Many of the occupants of this space will be people that are recovering from injuries, for this reason I also think that using the Flynn mode to create a more relaxed environment could benefit this space, and help the occupants be a little better while working toward recovery.

E_h	E_v	Avg:Min
100 lux	30 lux	3:1

Table 2.3 | Illuminance criteria for healthcare physical therapy.

Space	Allowance
Physical Therapy	0.91 W/ft^2

Table 2.4 | LPD allowance for physical therapy room.

Design Priorities

1) Additional daylight
2) Psychological impression
3) Fixture/ layout changes
4) Illuminance levels

Evaluation of Existing Lighting

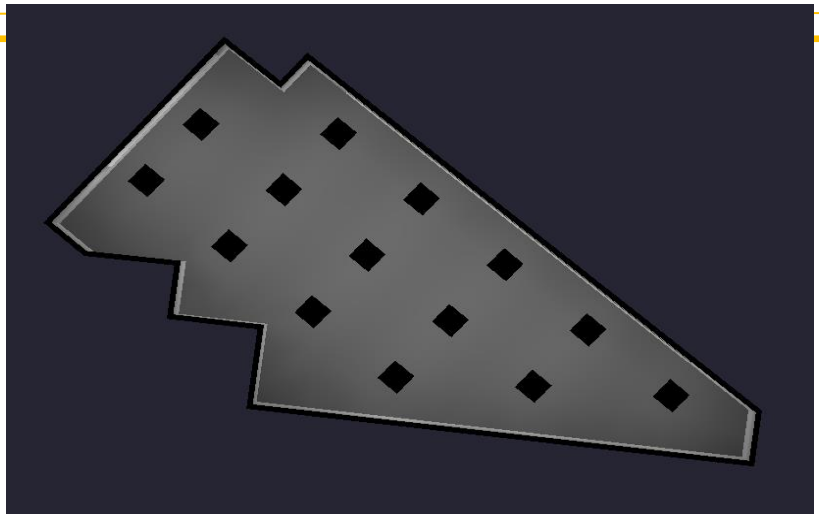


Figure 2.5 | Rendering of the lighting in the physical therapy space.

E_{avg}	46.87 FC
E_{max}	62.2 FC
E_{min}	19.7 FC
$E_{Max/Min}$	3.16

Table 2.5 | Metrics for the lighting.

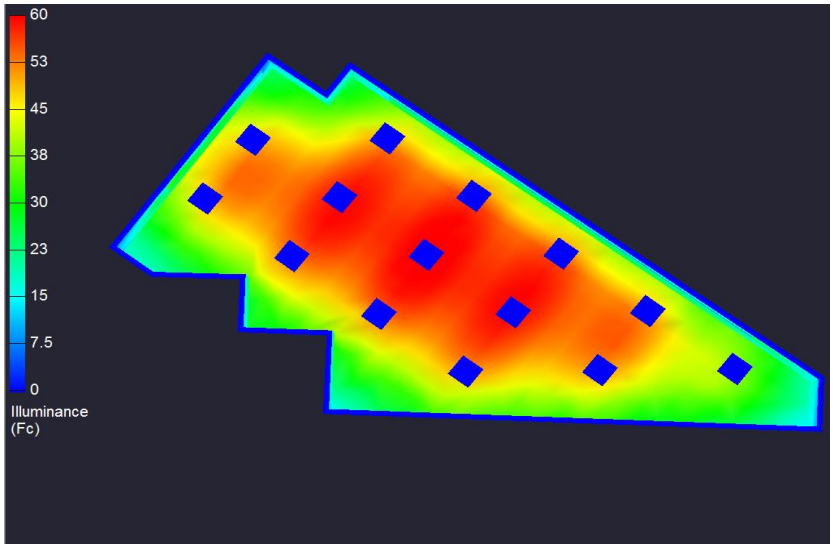
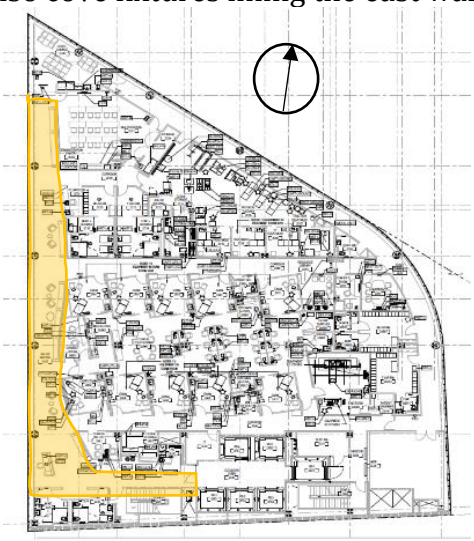


Figure 2.6 | Lighting levels in the physical therapy space.

The lighting of this space consists solely of a grid of 2' x 2' LED downlights. This is a very functional way to light the space, but it is not the most interesting, and probably isn't the best way to light the space. The unique geometry of the room makes it a little challenging to light. Even though it is not the best solution for the space, this design does a very good of lighting the space and meeting the criteria set forth by the IES hand book, and ASHRAE. The space is slightly over lit, but due to the fact that there are a variety of functions and tasks that will be taking place in the space the additional light will make the space more flexible. A light loss factor of 0.9 was applied to the fixture, these fixtures are in a space that will be getting clean on a regular basis, and since they are LED's a 0.9 LLF is accurate. The calculation grid was just placed on the floor. The fixtures are incredibly efficient and the space is way below the LPD allowance, the space only uses 0.65 W/ft^2. I don't think there would be much of a glare problem in this space, unless you were to look directly into the fixtures.

Pause Waiting 2L05

Located on the 2nd floor, the pause waiting 2L05 is a waiting room that also serves as a hallway along the west side of the building. Being along the outside of the building this space has a large glass curtain wall on the west side, this means it gets a lot of natural light. Being that it faces almost directly west this natural light is usually going to be good useful light, but in the late hours there may be a glare problem. The lighting in the space consists of a row of round downlights 8' and 6' on center, all the way down the west wall and center of the corridor on the south, and a single round pendant over the reception desk. There are also cove fixtures lining the east walls of the space in between the hallways.



Existing Conditions

Approx. Area | 1540 ft^2
Ceiling Height| 9'0"

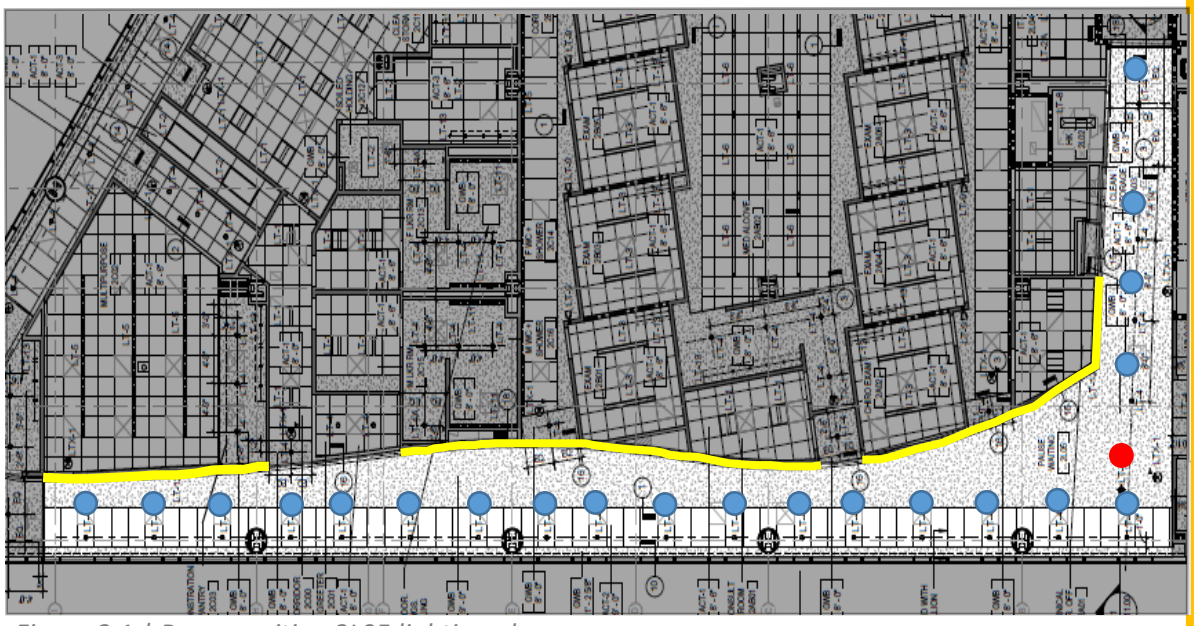


Figure 3.1 | Pause waiting 2L05 lighting plan

This space has no controls, and is controlled by the master system of the building that adjusts the lights based on timers.

Type	Description	Watts	Lamp	MFR.
LT-14	Pendant mounted cylinder LED fixture with wide beam spread distribution, aluminum housing, 10” x 5.25” with 3” aperture, and integrated electronic 0-10 V dimming driver.	20 W	Integral LED	USAI
LT-4	Recessed round LED downlight with 4.5” aperture, clear diffuse reflector with white trim, wide distribution, and integral electronic 0-10 V dimming driver.	21 W	Integral LED	Focal Point
LT-12	Surface mounted LED wall grazer, integral 30º x 60º grazing distribution optic, extruded aluminum housing, clear polycarbonate lens, white finish, and integral electronic driver.	8 W/ft	Integral LED	Ecosense

Table 3.1 | Pause waiting 2L05 fixture schedule.

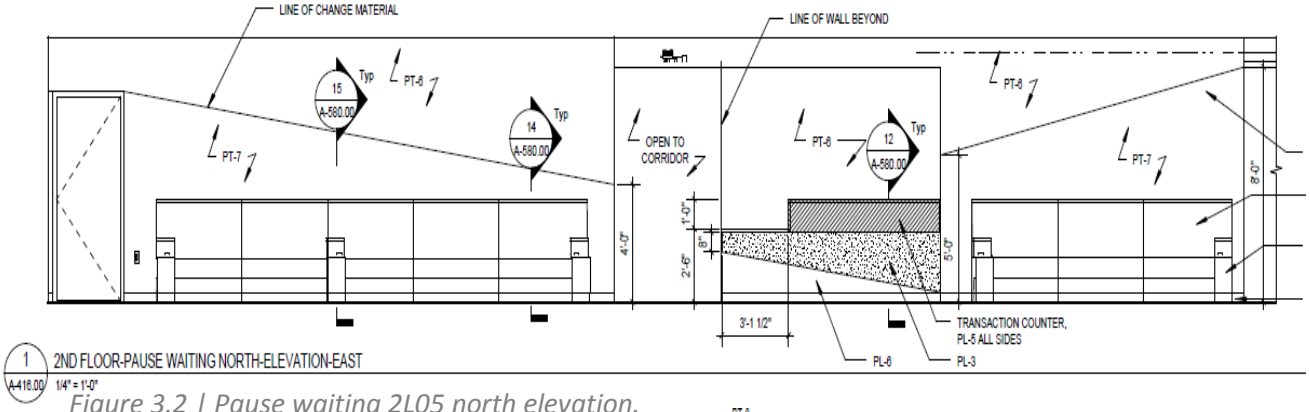


Figure 3.2 | Pause waiting 2L05 north elevation.

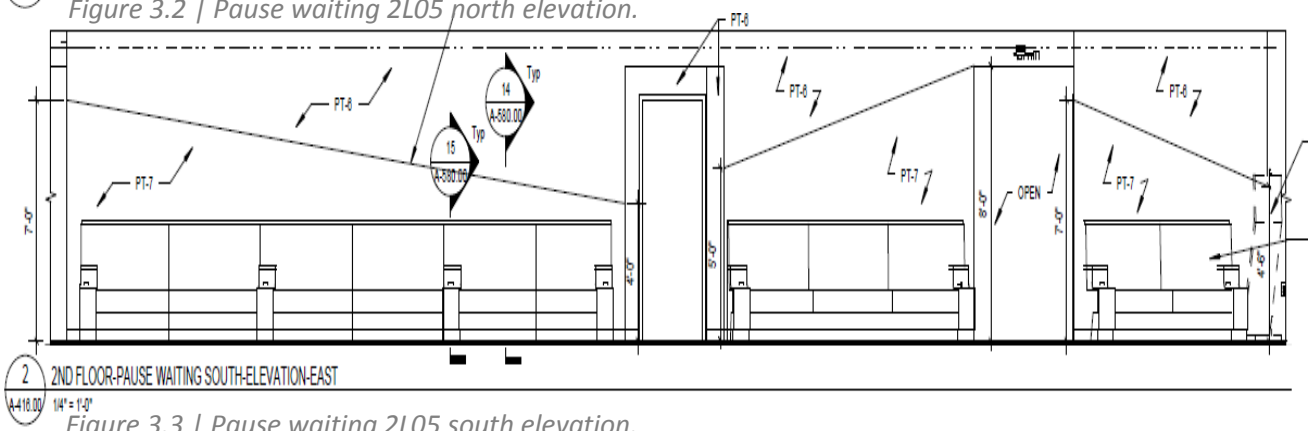


Figure 3.3 | Pause waiting 2L05 south elevation.

The materials used in this space contribute to the façade of the building, because it is mostly enclosed by glass so the interior is what is seen from the outside. The ceiling consists primarily of GWB, but there is also a row of acoustical ceiling tiles that are 2‘x 4‘ close to the windows. The walls in the space are made of GWB with sound attenuation batting and have a coating of two different colors of textured paint, and the glazing from the curtain wall. The floor in the space is finished with carpet on one side and terrazzo floor tile on the side closest to the windows.

Surface	Material	LRV
Ceiling	Acoustical Ceiling Tile	0.86
	GWB	0.83
Walls	Curtain wall Glazing	Transmittance= 0.78
	GWB with paint 6	0.67
	GWB with paint 7	0.70
Floor	Carpet	0.45
	Terrazzo Floor Tile	0.82

Table 3.2 | Pause waiting 2L05 finishes

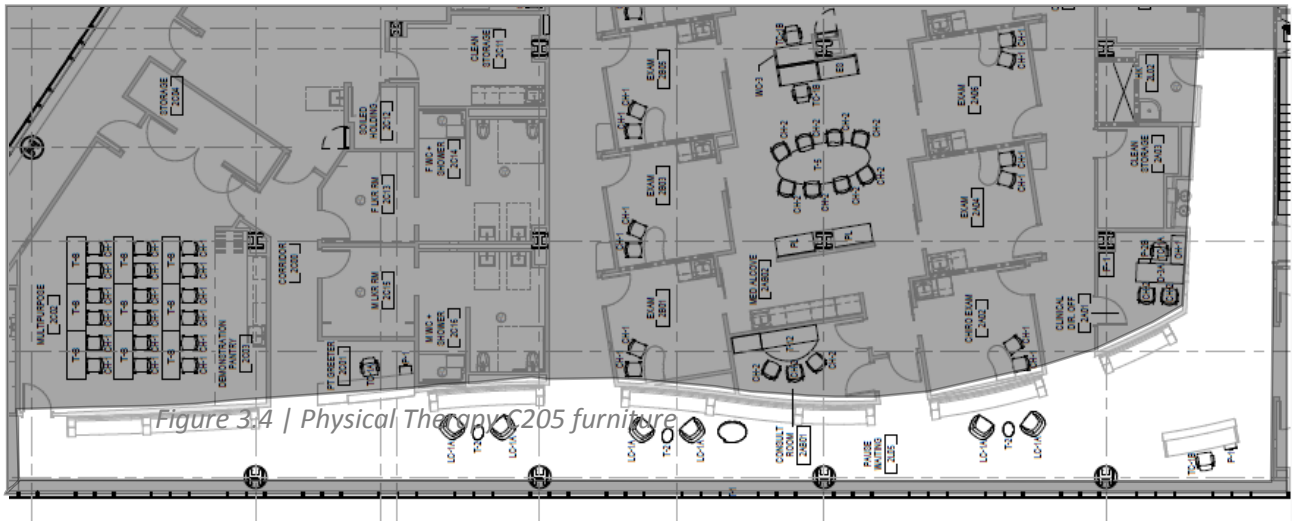


Figure 3.4 | Physical Therapy C205 furniture

Design Criteria &Considerations

This space serves several purposes. It is a waiting room, and a transition space through the building. Based on the orientation of the space, and the location of the windows the space is open to major glare issues late in the afternoon. Facing west, low sun angles could penetrate in and create harsh glare. The redesign will aim to diminish this problem. Another change that needs to be done, involves the fixture layout. With a more interesting layout, the space could be more enjoyable for the occupants that may be in there for a long time.

E_h	E_v	Avg:Min
300 lux	150 lux	4:1

Table 3.3 | Illuminance criteria for healthcare transition reading/ waiting areas

Space	Allowance
Physical Therapy	0.99 W/ ft²

Table 3.4 | LPD allowance for corridor in a hospital.

Design Priorities

1) Daylight glare control
2) Fixture/ layout changes

Evaluation of Existing Lighting

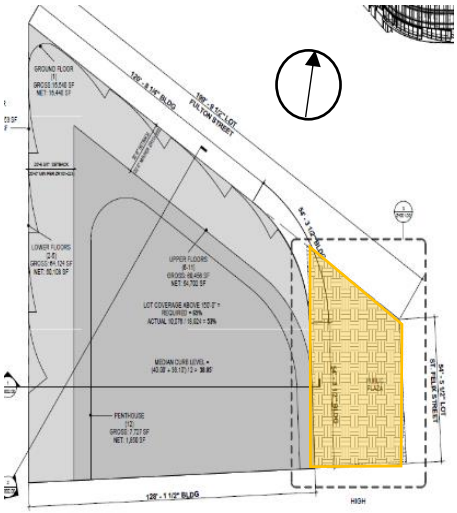
For the most part the lighting in this space is very well done. There are accent lights on the walls, and downlights for ambient light. This lighting design is good, and functional, but the downlights stick to the grid set forth by the ceiling tiles. This presents problems when there are columns, because they do not keep the same distance between fixtures. This is a small issue, but it could really present an eye sore for people. With the windows there is more than enough light in the space, and by utilizing LED fixtures they managed to reach appropriate light levels with a low LPD. There also could be a glare issue in the space. When the sun reaches low angles in the late afternoon the sun might shine right into the windows and create harsh glare. The space could benefit from more advanced controls that dim the lights based on illuminance levels rather than time.

Privately Owned Public Plaza

Located on the ground floor, the privately owned public plaza is an outdoor space that is open for the public to use. This space consists of multiple planters, several areas for people to come and rest and relax, water fountains, and a variety of plants and trees. This is also a transition space around, and into and out of the building. The spaces lighting consists of several light poles, in-ground lights, strip lights, and assorted accent lights.

Existing Conditions

Approx. Area | 800 ft²



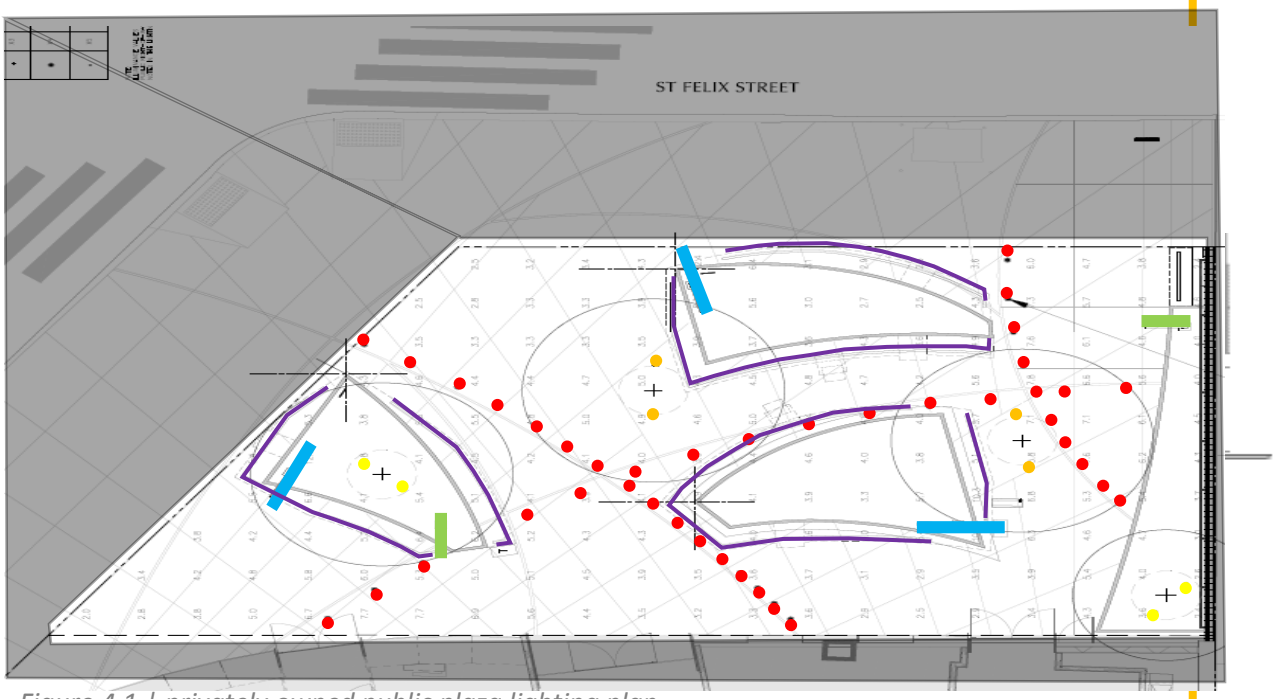


Figure 4.1 | privately owned public plaza lighting plan

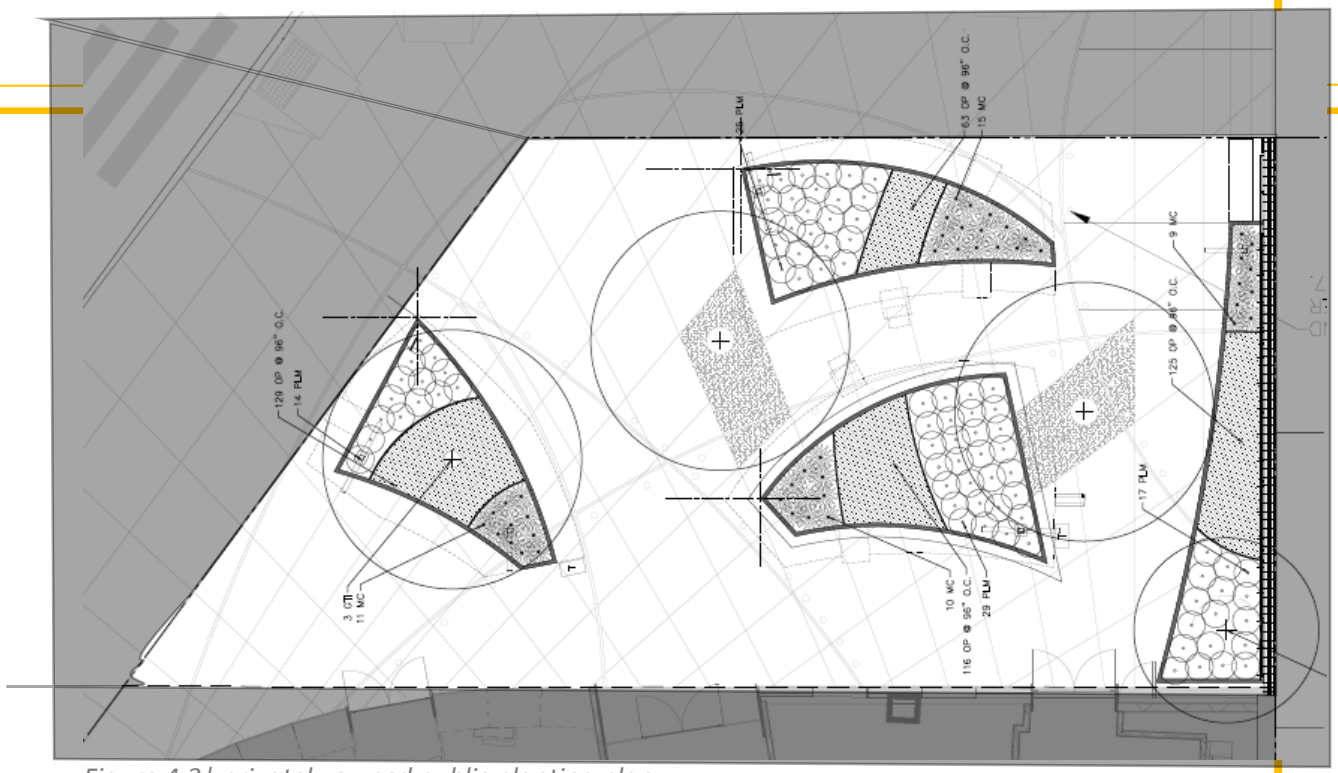


Figure 4.3| privately owned public planting plan.

Design Criteria & Considerations

This space will be used many different ways, it will be the main entry to the building, but will also be a peaceful spot for people to relax. There are numerous tasks that could be taking place simultaneously in this plaza. For this reason I want to use this space to come up with multiple designs. This way I can explore many different solutions and figure out what makes the most sense for the space. I want the space to be aesthetically appealing and create a nice way to enter the building. I also want to create an environment that makes people feel welcome. I also want the space to be enjoyable when people are there. I also want to light the space in a way that it does not have an excessive amount of light pollution.

Table 4.3 |Illuminance criteria for plazas and town squares, zone 4.

E_h	E_v	Avg:Min
4 lux	2 lux	5:1

Table 4.4 | LPD allowance for plaza areas, zone 4.

Space	Allowance
Privately owned public plaza	0.2 W/ ft^2

Design Priorities

1) Aesthetic appeal
2) Psychological impressions
3) Illuminance levels –safety
4) Light Pollution

Evaluation of Existing Lighting

The privately owned public plaza is a wonderful space. It creates a nice public space that allows people to rest and relax, and it creates a wonderful way into or out of the building. The lighting in this space is interesting. There are good aspects to the design, but for the most part it seems random and arbitrary. There are some lights that celebrate the nature of the space, but most of the in-ground fixtures are just there creating light trespass into the sky. They form an abstract path to the entrance to the building. The design isn't strong enough for the type of space and type of building it is. The LPD in the plaza is low, and by utilizing solar powered fixtures they are able to save a lot of power. The in-ground fixtures not only create light trespass, but also create small patches of glare throughout the space. This is a good design and very interesting, but could be improved upon. Through creating multiple designs the best solution will reveal itself.

References

ASHRAE Standard 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings. 2013th ed. N.p.:ASHRAE, n.d.

Print.DiLaura, David, Kevin Houser, Richard Mistrick, and Gary Steffy. Illuminating Engineering Society The Lighting Handbook. 10th ed. N.p.: IESNA, n.d. N. pag. Print.